Introduction to Flexible Treatment Options

November 18, 2011

MIDS Work Group Meeting

p-gen3-13k

Presentation Outline

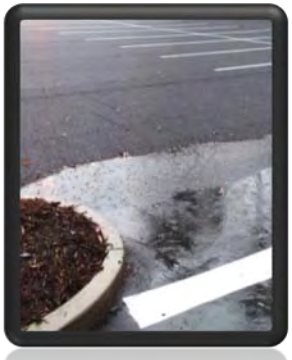
- Background
  - Review benefits and limitations of MIDS Phase 1 Performance Goal
- "Flexible Treatment Options"
  - Objective and relationship to existing regulations and approaches
- Next Steps
  - What information does the Work Group need?

Background:
Performance Goal

"For new, nonlinear developments that create more than one acre of new impervious surface on sites without restrictions, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be retained on site for 1.1 inches of runoff from impervious surfaces statewide."

1.1 inch

X



Background:
Performance Goal Limitations

- Sometimes…
  - Some volume control is achievable, but not the entire requirement
  - Infiltration is physically impossible
  - Infiltration might lead to other problems
  - Volume control might be excessively expensive

Background:
Performance Goal Limitations

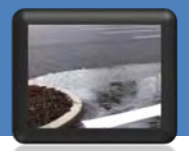
- Can we achieve similar performance outcomes in these situations using flexible treatment options?
  - Let's review performance goal benefits

Background:
Regulatory Benefits

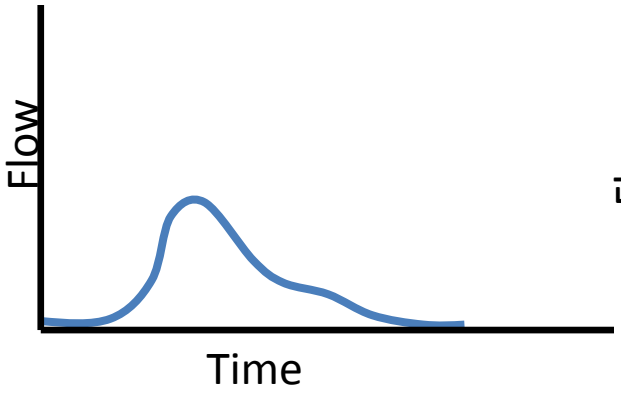
Performance goal meets 2009 legislation and complies with antidegradation requirements

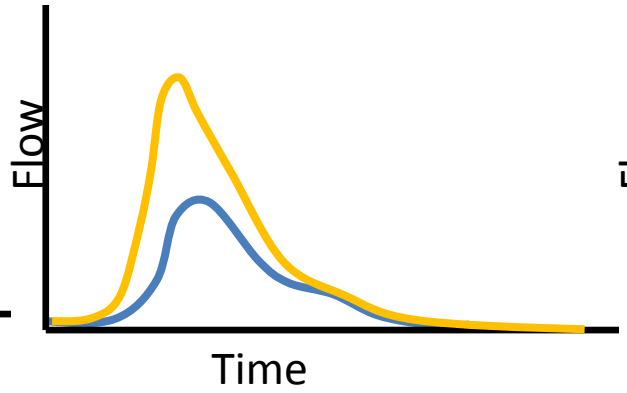
- Legislation:
  - MIDS sites will mimic native hydrology
- Antidegradation:
  - MIDS sites will “avoid and minimize net increases in loading”

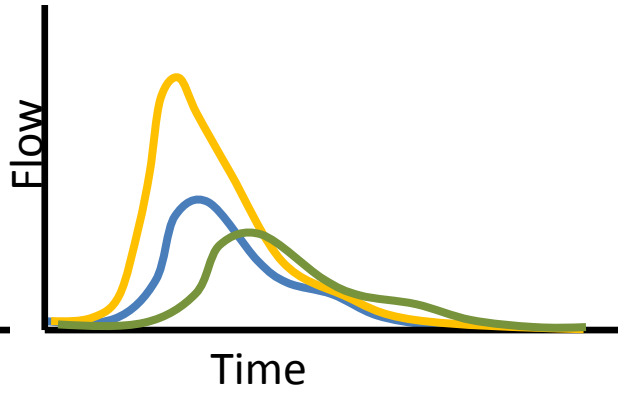
Background:
Benefits to MN Waters

1.1 inch X 

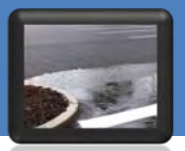
- Stormwater performance goal will:
  - Reduce the volume to downstream waterbody



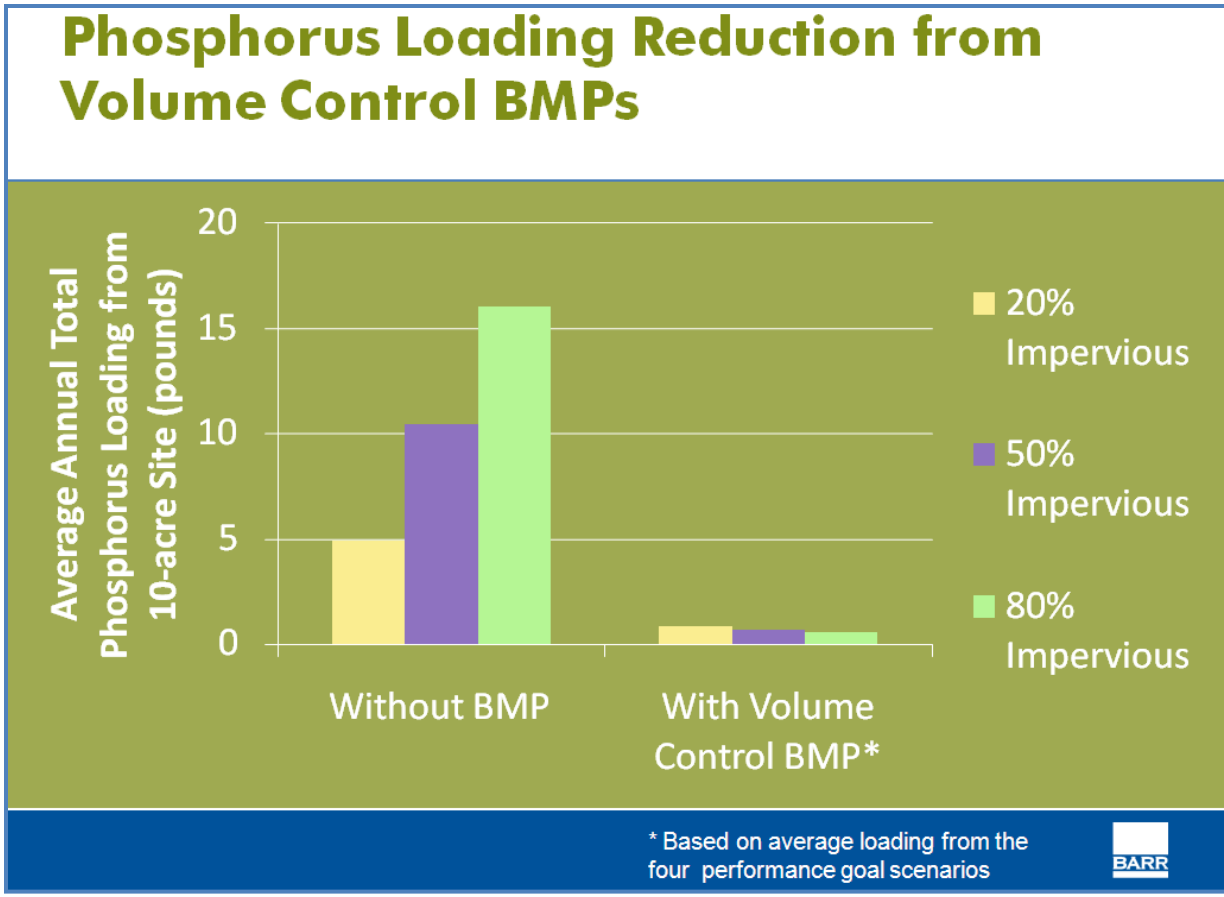




Background:
Benefits to MN Waters

1.1 inch X 

- Stormwater performance goal will:
  - Reduce the phosphorus loading to downstream waterbody

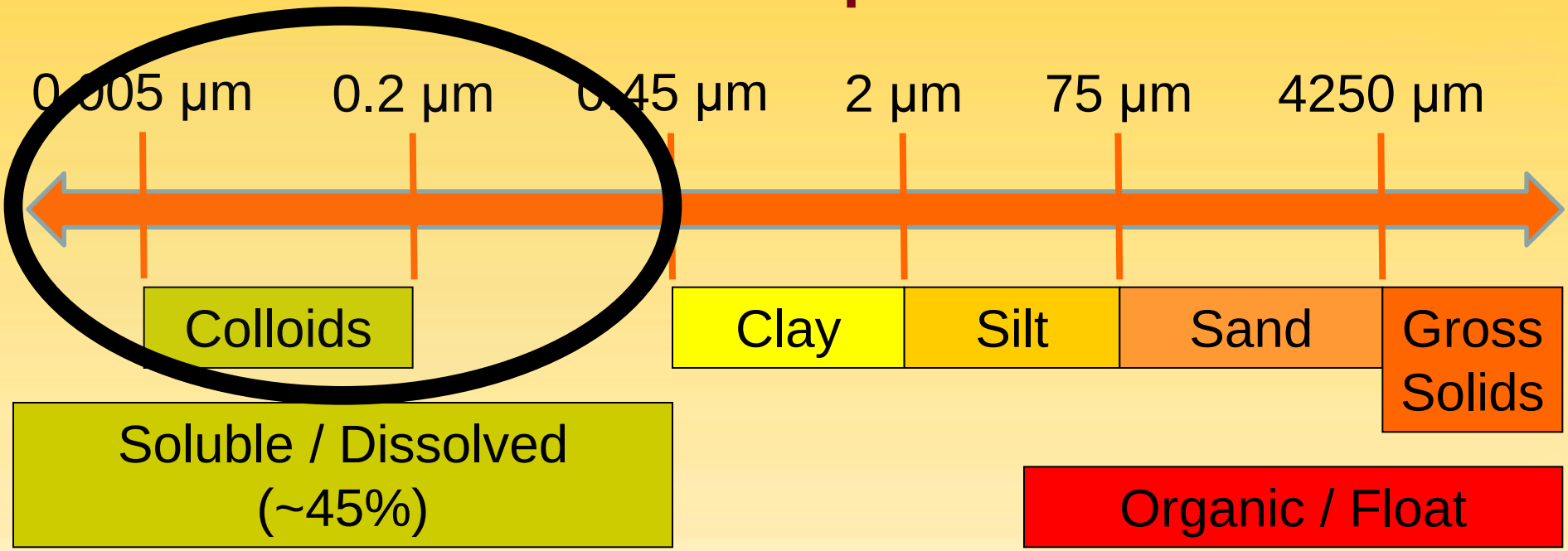


Background:
Benefits to MN Waters

- Volume reduction BMPs remove pollutants from entire particle size spectrum

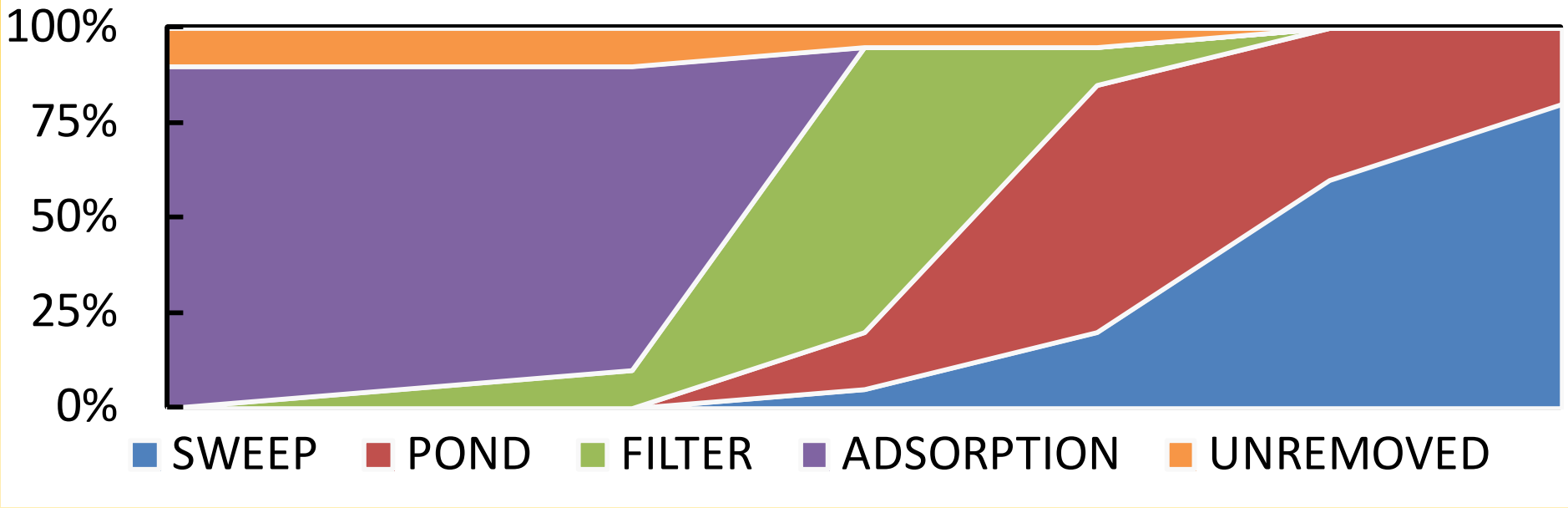
- Especially significant with phosphorus
  - Dissolved phosphorus difficult to remove

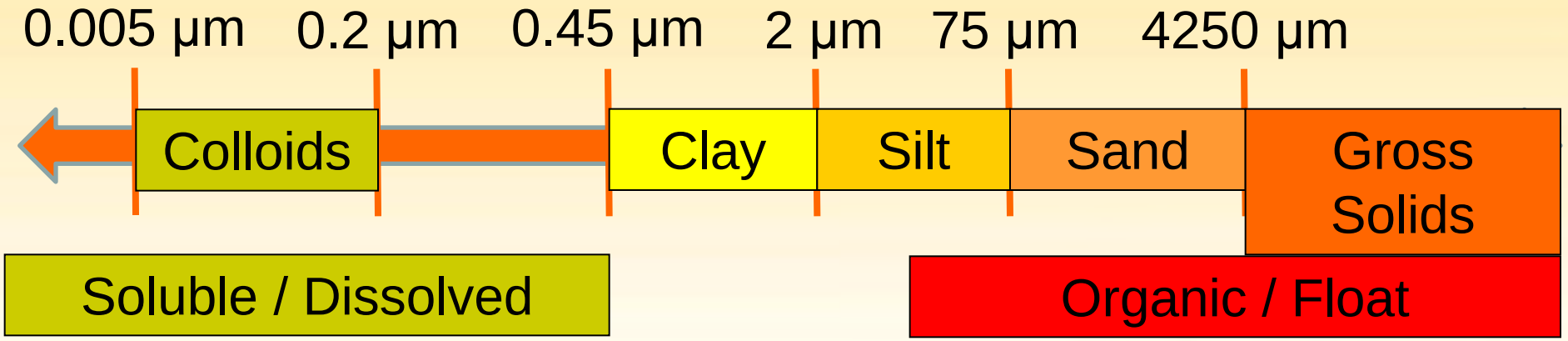
Pollutant Spectrum



- Varies by:
  - Pollutant
  - Location in management system

BMP pollutant size removals





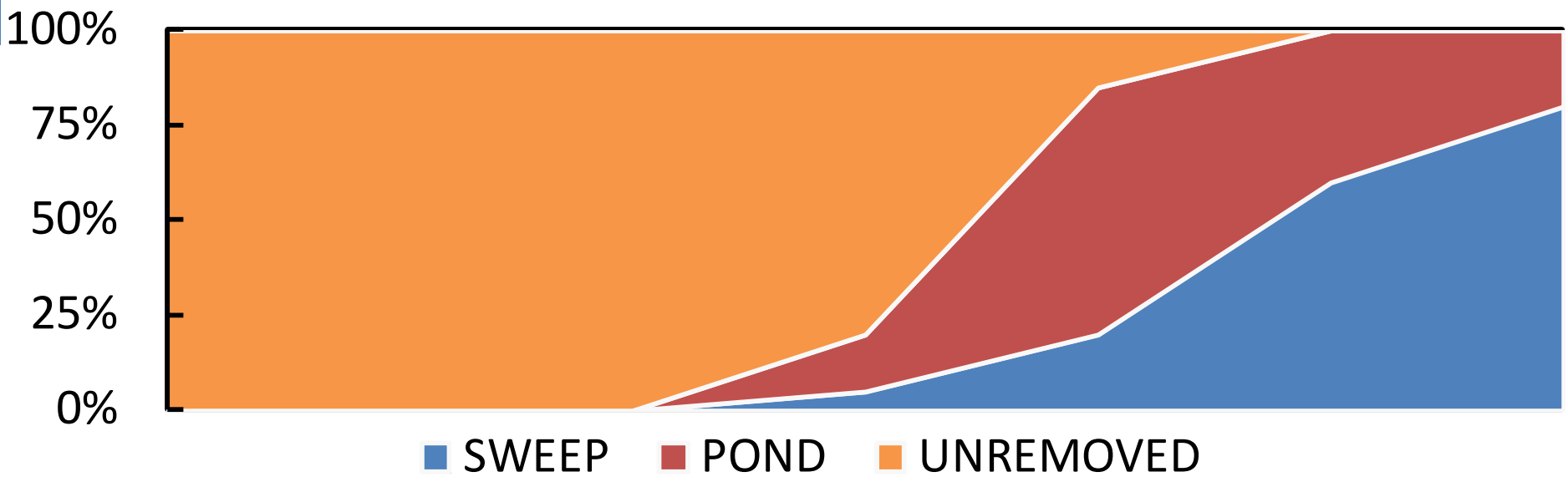
Background

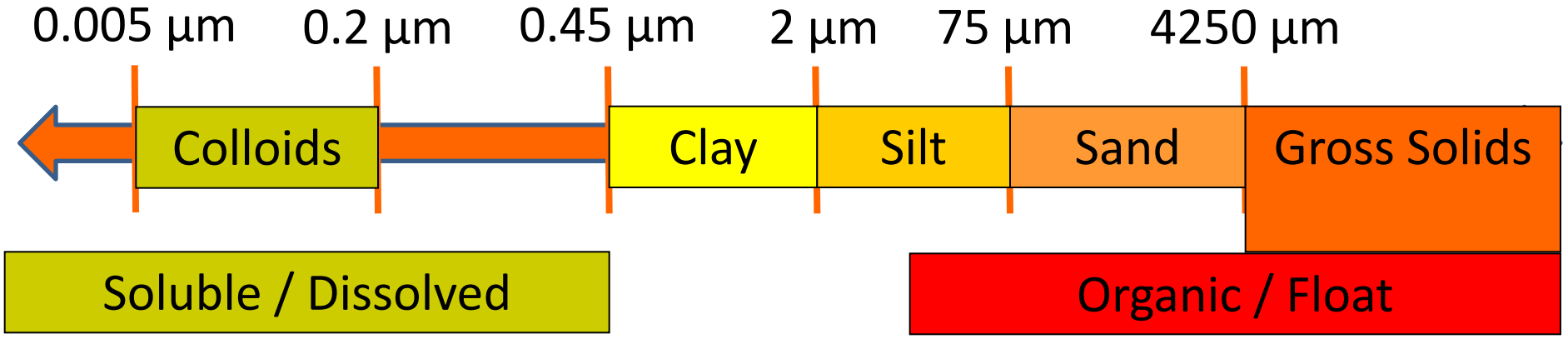
Phosphorus Removal of Non-Volume Reducing BMP

Example: Wet Ponds

Photo: Valley Branch Watershed District

Background
Pond pollutant size removals

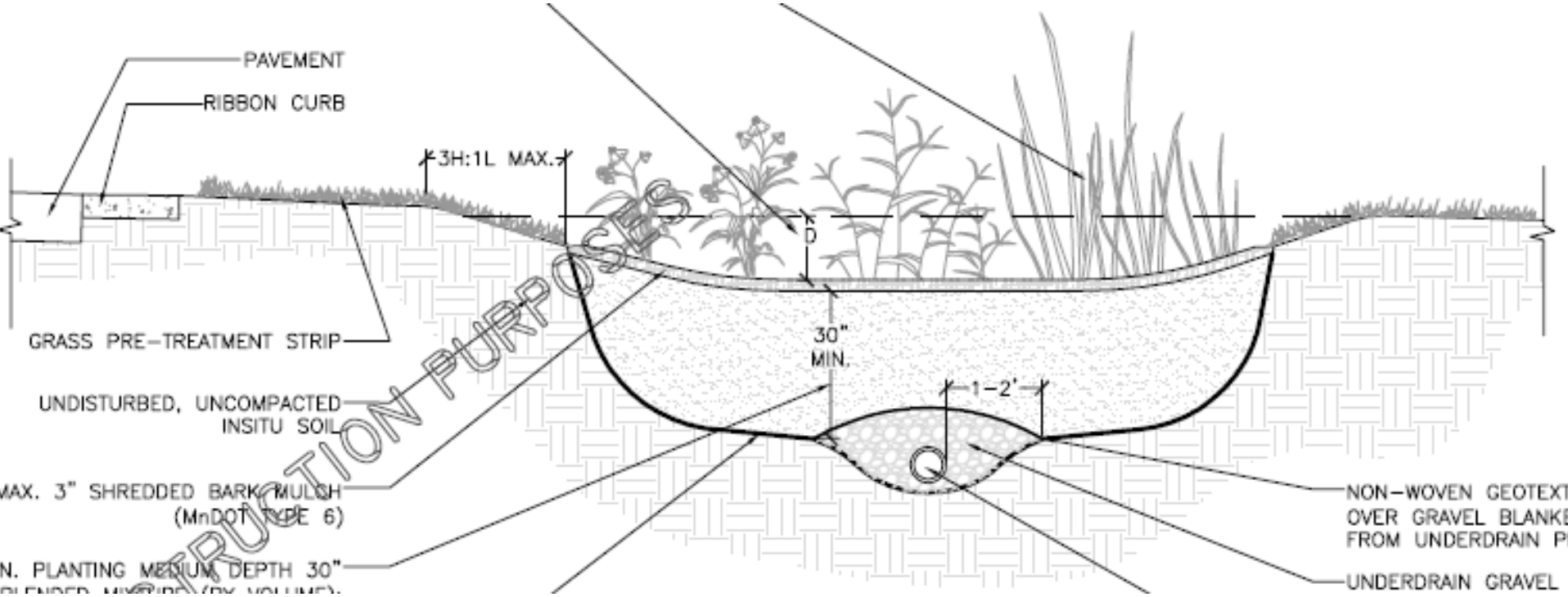




Slide concept and data: University of MN St. Anthony Falls Lab and City of Prior Lake

Phosphorus Removal of Non-Volume Reducing BMP

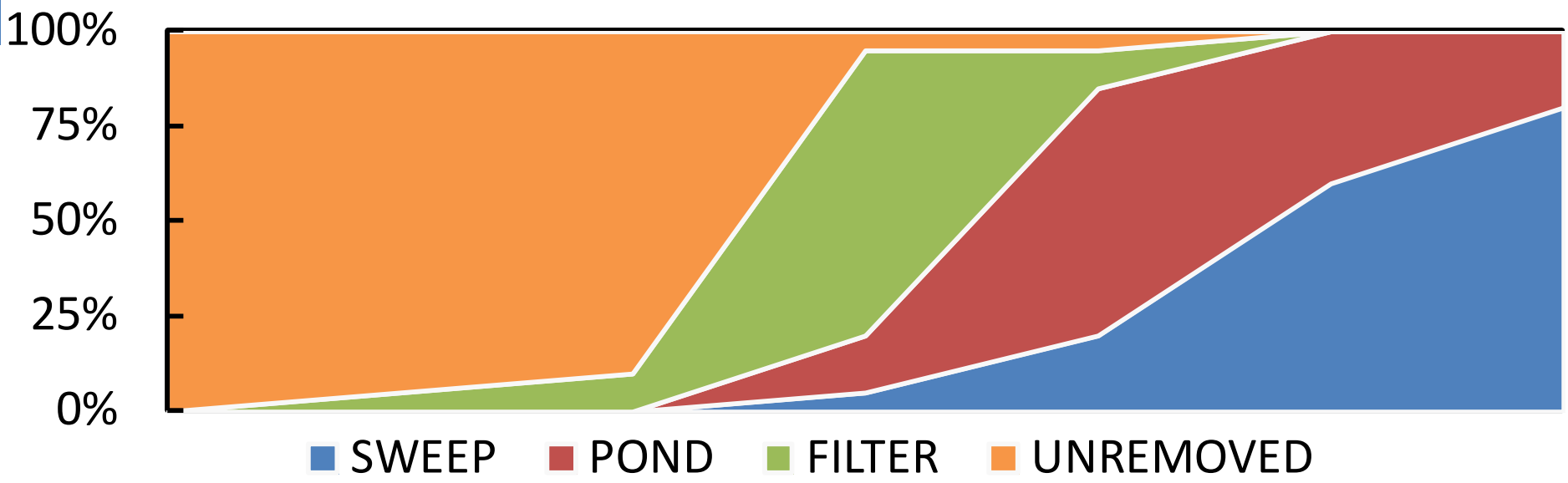
Example: Filtration

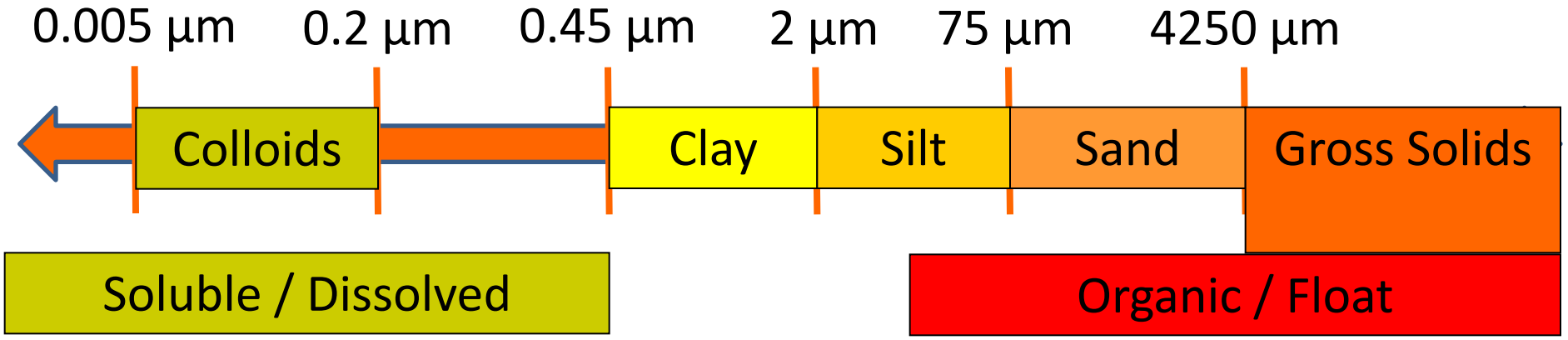


Source: 2005 MN Stormwater Manual, Bioretention/Filtration Only Facility

Background

Filtration pollutant size removals





Slide concept and data: University of MN St. Anthony Falls Lab and City of Prior Lake

Background

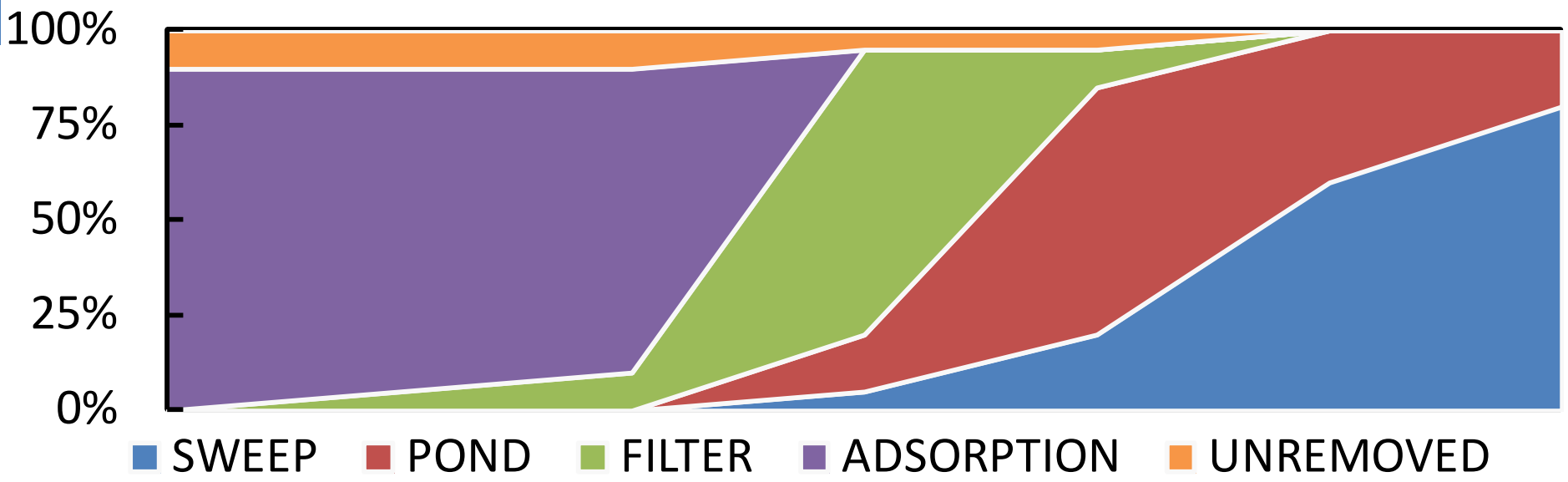
Phosphorus Removal of Non-Volume Reducing BMP

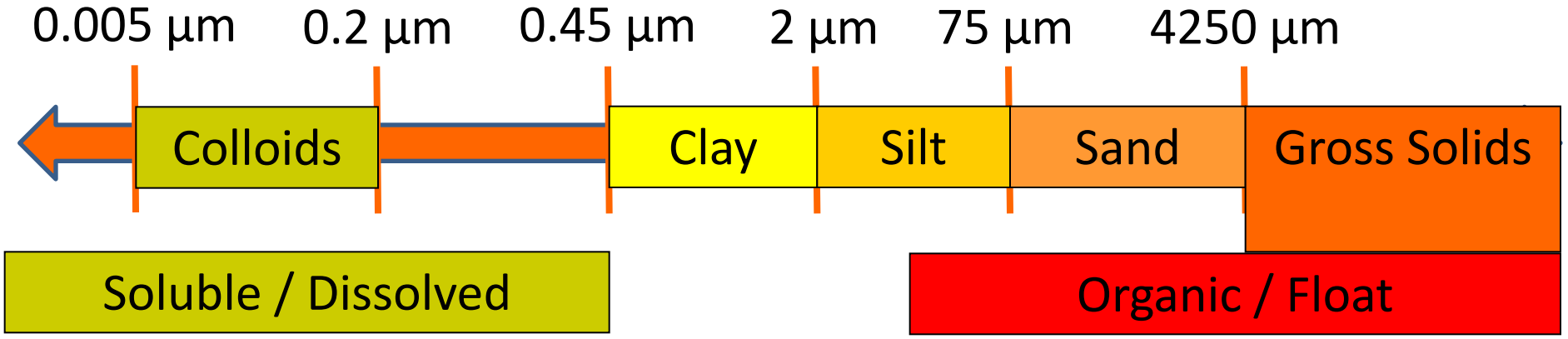
Example: Adsorption

Photo: Barr Engineering Company, Ramsey-Washington Metro Watershed District Enhanced Sand Filter

Background

Adsorption pollutant size removals





Slide concept and data: University of MN St. Anthony Falls Lab and City of Prior Lake

Background:
Performance Goal Limitations

- Again, sometimes…
  - Some volume control is achievable, but not the entire requirement
  - Infiltration is physically impossible
  - Infiltration might lead to other problems
  - Infiltration might be excessively expensive

Flexible Treatment Considerations

So… questions to be answered:

- Can we achieve similar benefits through flexible treatment options?
- If not, what level of treatment is acceptable?

Flexible Treatment Considerations

- Objective for sites with restrictions is to still meet antidegradation requirements

Adoption of the MIDS package is a path to compliance with antidegradation

- MPCA's alternative analysis approach (draft) can provide a roadmap for evaluating flexible treatment options

Antidegradation

What are the prudent and feasible alternatives that avoid and minimize net increases in loading?

Definition of "Prudent" Alternatives*

"Prudent" (in context of antidegradation alternatives analysis):

- Selected with care and sound judgment
- Does not have unusual or extraordinary economic, social, or environmental costs

* Based on MPCA's Draft Antidegradation Rule (5/25/11)

Framing Flexible Treatment Options: Antidegradation
Definition of "Feasible" Alternatives*

"Feasible" (in context of antidegradation alternatives analysis):

- Capable of being done with existing technology;
- In accordance with acceptable engineering standards;
- Consistent with reasonable public health, safety, and welfare requirements;
- Legally possible; and
- Has supportive governance that can be successfully put into practice to accomplish the task.

* Based on MPCA's Draft Antidegradation Rule (5/25/11)

Framing Flexible Treatment Options:

What are some WD/WMOs doing?

Elm Creek WMO	Rice Creek WD	Comfort Lake Forest Lake WD	Browns Creek WD	Valley Branch WD
No increase in P loads and extended detention	Water quality BMPs – preferred order	On-site to max extent feasible; equivalent off-site or banking; cash	On-site infiltration and off-site infiltration required to the extent feasible	NURP ponds or equivalent water quality treatment

Framing Flexible Treatment Options:
What are some WD/WMOs doing?

Nine Mile Creek WD	Minnehaha Creek WD
Half of typical volume control required; if all options exhausted, cash in lieu of volume control BMP (currently $40,000/acre)	Abstraction of runoff to the greatest extent feasible, and at least 0.5 inches, and phosphorus control in an amount equivalent to that which would be achieved through abstraction of one inch of rainfall from the site's impervious surfaces

Framing Flexible Treatment Options:
What are some WD/WMOs doing?

Vermillion River Watershed JPO	Scott County WMO	Carver County WMO
Various BMPs (credits) and site design practices to minimize the creation of connected impervious surfaces are used to the extent practical; filtration		90% removal of TSS; flexibility

Proposed approach to evaluating flexible treatment options

Can [select BMP(s)] achieve similar results (volume, TP, and TSS removals)?

Yes

No

- Is this BMP(s) prudent and feasible?

No

- What other BMPs will result in less degradation?
- How much treatment is enough?

Yes

Proposed approach to evaluating flexible treatment options

Re-Use Example

Can harvesting & re-use achieve similar results (volume, TP, and TSS removals)?

Yes

- Is this BMP(s) prudent and feasible?

No

- What other BMPs will result in less degradation?
- How much treatment is enough?

Yes

Proposed approach to evaluating flexible treatment options

Wet Pond Example

Can a wet pond achieve similar results (volume, TP, and TSS removals)?

Yes

No

- Do wet ponds provide enough treatment?
- Will other prudent & feasible BMP alternatives result in less degradation?

Stormwater Dissolved Phosphorus-Reducing BMPs

Volume-Reducing BMPs		Non-Volume-Reducing Structural BMPs
Infiltration Based	Non-Infiltration Based	
Bioretention Basins	Green Roof	Enhanced filtration (e.g., iron)
Infiltration Basins	Re-use	Additive (e.g., alum)
Pervious Pavement	Trees	
Infiltration Trench	Extended Detention?	
Dry Swale		

Big Question:

Only non-infiltration, volume control BMPs (e.g., green roofs, re-use) and BMPs that manage dissolved phosphorus (e.g., enhanced filtration) can achieve similar treatment results on sites with restrictions.

Is requiring these BMPs prudent and feasible?

Yes

- Performance goal for sites with restrictions can be "provide equivalent TP removal"

No

- How much treatment is enough?

What does MIDS Work Group need to move forward?

Potential needs:

- BMP performance and (cost) impacts?
- Definition of MPCA's acceptance?

  (Maybe have MPCA talk in December on what is acceptable on sites with restrictions to comply with anti-deg?)
- Draft performance goals to discuss, react to, and edit?
- Homework: Review other entities' performance goals (handout and individual research)

Introduction to Flexible Treatment Options

November 18, 2011

MIDS Work Group Meeting